International Journal of ChemTech Research
CODEN (USA): IJCRGG ISSN: 0974-4290
Vol.7, No.5, pp 2408-2412, 2014-2015

Sea Food Landings and Utilization in Andhra Pradesh: India, with Reference to Visakhapatnam Fishing Harbour- A Survey.

Sudharani. P.

Department of Biotechnology, GITAM Institute of Technology, GITAM University, Visakhapatnam-530 045, Andhra Pradesh, India.

Abstract: Visakhapatnam is one of the main harbours with deep-sea trawler base on the east coast of India. Field survey was conducted in Visakhapatnam fishing harbor (VFH) between December 2013 and November 2014, aimed to collect data relating to harbor landings of seafood, export, consumption, by-catch, discards of unwanted catch, the fate of trash and utilization of seafood processing waste. Even though, the present survey gives some knowledge to fulfill the desired objectives, further research is needed to be done for determining the exact estimates.
Key Words: VFH, Landings, by catch, discard and processing waste.

Introduction:

In India, Andhra Pradesh ranks sixth among the eight maritime states and second among the four east coast states in marine fish production, with a coastline of 974 km, which is about 12.5% of India's coastal length. In Andhra Pradesh, Visakhapatnam is one of the main harbours for the mechanized boats, where adequate shelter, shore facilities exist and is the only deep-sea trawler base on the east coast of India. Regarding the sea food landings and utilization at VFH, very limited work is done[1-5]. The present survey was carried out between December 2013 and November 2014, aimed to collect data relating to seafood landings at the harbor from different fishing grounds, export and local consumption of seafood, by-catch and discards at the harbor, the fate of trash catch and utilization of seafood processing waste.

Material and Methods:

During the entire study period, field survey was conducted once a week to observe the desired aspects in VFH, which was located on the east coast of India (17º14´13´´ N and 83º17´45´´ E) extending 5 km from the northwestern arm to the outer harbor and is connecting to the open sea through the entrance channel. The catch details from individual boats were noted after landing from the crew along with other information like overall length of boat, cod-end mesh size, depth of operation and nature of fishing grounds, in addition to the secondary data[6, 7]. Trade details were collected from traders of the 'seafood trading centre' located at the harbor and local sellers in Visakhapatnam. By catch from each landing of individual boats, its utilization and discards were observed and recorded; the crews were also enquired about the discards into the sea in different hauls. The knowledge of seafood processing waste and utilization was updated through literature study.

Results and Discussion:

The present survey was resulted in understanding about the landings of seafood at VFH, export, local consumption, by-catch, discards and utilization of processing waste during the study period.

Landings, Export And Consumption:

More than 50% of the marine fisheries production of India is accounted by trawl fisheries. Among this, Andhra Pradesh is contributed for 9% of Indian trawl landing of which a share of 51% is by VFH.

At VFH, both mechanized and non-mechanized boats are being used regularly for fishing. Mechanized boats are called sona boats and non-mechanized boats are called fiber boats which are locally known as 'theppalu'. Each sona boat measures 14m. long, 4m.wide and (3+ 10) m. height, with the ground block of the boat for storage. In each sona boat, a crew of 10 fishermen will go for fishing along with 10 fishing nets, 10 tons of ice, diesel and other requirements. These are multiday fishing trawlers (MDF), return to the harbor after 10-15 days and the catch will be landed.

The non-mechanized boats (fiber boats) will go for fishing in the early hours of the day and return to the shore in the evening of the same day, which constitute single day fishing (SDF). Each fiber boat measures 10m. long, 2m. wide and 3m. height. After landing, the catch which was already sorted out onboard will be loaded to the pulling carts; large proportion of the catch will be sent to 'seafood trading centre' where the salesmen buy them, pack in thermocol boxes with layers of ice in 1:1 ratio, seal and transport to processing factories, so that they will reach the destination within 24 hours. The remaining large quantity of the catch is mainly used for consumption, which is subjected to auction for local market at seafood auction centre located in VFH.

Shrimp, being in great demand[8], with 16% of the total value of internationally traded fishery products[9], constitute the major marine resource traded in terms of value and is sold out as soon as it is landed and finds its way quickly to processing factories where it is frozen and packed. Frozen fish and frozen shrimp are the important marine export items at VFH, which gave rise to a vibrant fishing industry in the state.

Andhra Pradesh provides most of its own fish needs and exports some surplus to other states and overseas. Visakhapatnam port is one of the channels that exports roughly half of the seafood from Andhra Pradesh. According to the data collected from seafood exporters, seafood exports from Andhra Pradesh to other countries shows a healthy 20 per cent growth during 2013-2014 in volumes over the last two years. However, the state which had over 55-60 exporters about 10 years back has only around 40 exporters at present and they won't be able to meet the international demand owing to the inadequate infrastructure. According to industry sources, the state's seafood industry accounts for a 40% share in India's seafood exports.

According to ref.no.6, the total marine landing in Andhra Pradesh during 2013 was 2.66 lakh t registering a decrease of 12.5% from the previous year. The contribution of sona boats to the trawl landings of Andhra Pradesh was 96.1% and the contribution of small mechanized trawlers was 3.9%.

According to ref.no.7, the export of marine products during the financial year 2013-14 reached an all time high and crossed all previous records with a growth of 5.98% in quantity, 60.23% in rupee and 42.6 % growth in US $ earnings. Major items of export are frozen shrimp which continued to be the major export value item accounting for a share of 64.12% of the total earnings. Shrimp exports during the period increased by 31.85%, 99.54% and 78.06% in quantity and rupee and US $ value respectively.

By Catch and Discard:

At VFH, considerable amount of by catch in the harbor landings is observed during the entire study period resulting in a need to improve it's utilization. The fishing trawlers bring in large quantities of by-catch, besides the principal fishery groups i.e. fishes, prawns, squids, cuttle-fish and lobsters. Eight groups of marine organisms namely coelenterates, shrimps, crabs, stomatopods, gastropods, cephalopods, echinoderms and finfish were recorded[5] in the trawl net by-catch landings at VFH.

Different groups of biota existed in the by-catch landed at VFH from SDF as well as MDF trawlers during the study period, is comprised of fin fishes, gastropods, bivalves, cephalopods, juvenile fish, small shrimps, stomatopods, crabs, lobsters and juveniles of unidentified sharks and rays of which fin fishes were the most dominant group. Juveniles of tiger shark as well as protected species of skates and turtles were also observed. Present survey coincides with a previous study[10], where fin fishes have dominated among the by-catch. Crustaceans find a prominent place in the low value trawl by-catch at the Chennai Fisheries Harbour[11] that was usually landed in a state of decomposition and had fetch very low price. Of 54,207 tonnes of annual

by-catch of south west coast of India, 281 species[12]; 237 species[10] of marine fauna with juveniles of commercially important fishes from different landing centres along the coast of India, were identified.

Among the catch, the low value fish but can be used for human consumption is brought to the shore and the fish which cannot be used for direct human consumption is considered as trash and it may either be landed or discarded into the sea there itself while fishing. With the help of information given by the crew, by-catch is more in trawls operated in shallow waters while discarding into the sea is high in bottom trawls operated in deeper waters (>30m) and also it can be known that the composition and the quantity of the trash depend on the gear, area of operation and season.

The trash after landing is subjected to auction and is dried for some hours by mixing with minimum quantity of salt, which will be used for aqua feed. However, there is conflicting data on the volume of trash fish landed at the study area. From the present survey, it may be given that the inshore fishery in Visakhapatnam is heavily over-fished but the total fish catch, as well as the proportion of biomass of trash in the total catch, continue to rise. Prior to the present survey also, at the same survey area, the by-catch landing showed a steady increase[10] from 2% to 21% due to enhanced demand for trash fish for the production of fish meal and fertilizer.

During the study period, most of the by-catch is brought to the landing centre in VFH by SDF trawlers only. The reason may be the by-catch which otherwise form discard would fetch some price; SDF trawlers may generally bring it to the landing centre to sell for making fish-meal or poultry-feed. In MDF trawlers, the by-catch obtained in the first few days will be thrown back onboard into the sea; as the requirement of ice storage is more for more valuable fish, the by-catch obtained in the later days of fishing also will be taken to the deck, will be kept with little ice and which should be brought to the landing centre in a highly spoiled state, even then be discarded.

By-catch is recognized as unavoidable in any kind of fishing where the reasons may be target and non target species co-inhabit the ocean space and coming under the influence of the harvesting systems employed. Most of the work on by-catches was carried out on west coast of India[13-20]. Few studies on by-catch were carried out on east coast of India [1,2].

Maximum discards from by-catch were stomatopods in SDF and fin fishes in MDF[19] from Karnataka coast. Along the Visakhapatnam coast, 25-30% of discards from trawlers were comprised of juvenile shrimps[21]. In the present survey, it is significant to note that among the by-catch, juveniles and those in the early stages of development are invariably discarded into the sea at the study area. It may lead to the depletion of resources[22]. On the other hand, physically damaged fish and other fauna which deteriorate rapidly also will be discarded from the by-catch.

Processing Waste and Utilization:

More than 70% of marine capture fisheries have been utilized for processing[23]. As a result, every year a considerable amount of total catch is discarded as processing leftovers and that includes trimmings, fins, frames, heads, skin and viscera. In addition to fish processing, a large quantity of processing byproducts are accumulated as shells of crustaceans and shellfish from marine bio-processing plants. Discards from the world's fisheries exceed 20 million tons equivalent to 25% of the total production of marine capture fisheries [23].

At VFH, different quantities of waste are generated at various stages between capture and consumption during the study period. Tuna is an important group of large pelagics and Visakhapatnam alone contributes to half of the total tuna catch for the state. They are locally called 'suralu'; support a regular fishery and brought from different landing centres to VFH for export. Huge quantities of tuna wastes and shrimp waste are being dried in the drying yard of VFH and Bhimili (30km from VFH); the final dried product is sold and utilized for the preparation of fish meal and bio-molecules. Sometimes a significant amount of shell waste is also sent to landfill as it is not wanted by the fishmeal plants. An alternative of beneficial use of this waste seems to be more preferable but as the costs to get finished products in the market are more viable, most of the processing waste may be disposed off simply. 20-80% of waste will be generated during processing of fish depending upon the level of processing and type of fish, which can be utilized as fish silage, fishmeal and fish sauce.

Fish waste can also be used for the production of various value added products such as proteins, oil, amino acids, minerals, enzymes, bioactive peptides, collagen and gelatin[24]. Likewise, the solid shrimp waste namely, head and shell which accounts approximately 40-50% of whole shrimp weight contain protein (35-40%), chitin (10-15%), minerals (10–15%) and caroteinoids[25]. An average 5150 t of shrimp waste is generated

annually [4] through VFH during the period 2008-2012. 205 tonnes of shells, 10 tonnes of gastropod operculum, could be produced annually in India and the production potential of chitin is estimated as 3,560 and 1,354 tonnes from shrimp and crab shell wastes respectively[26]. The extraction of various bio-molecules from the seafood processing waste using organic and inorganic acids, polar and non-polar solvents, fermentation with the aid of bacteria, using different enzymes was practiced by some researchers[3,27-30].

By evolving appropriate processing waste utilization methods and marketing strategies there will be a better scope for development and to fetch high unit value of different resulting products. So far, only a limited number of bio-molecules have been identified from isolated compounds and further research is needed to estimate the entire waste generated from seafood processing, the ratio of discard to it's utilization and to develop economically feasible recycling methods for the human health promotion.

References:

1. Sujatha K., Finfish constituents of trawl by-catch of Visakhapatnam, *Fish. Tech.*, 1995, 32 (1): 56-60.
2. Sujatha K., Finfish constituents of trawl bycatch of Visakhapatnam, *Fish. Tech.,* 1996, 11 (1&2): 17-23.
3. Prameela Kandra, Murali Mohan Ch, Smitha P.V., Hemalatha K.P.J., Bioremediation of Shrimp Biowaste by using Natural Probiotic for Chitin and Carotenoid Production: An alternative method to hazardous chemical method, *International Journal of Applied Biology and Pharmaceutical Technology,* 2010, 1 (3): 903-910.
4. Das Madhumita, Ghosh Shubhadeep, Dash Biswajit, Maheswarudu G., Rao M.V.Hanumantha and Venkatheswarlu O.C.H., Multifarious utilization of shrimp waste at Visakhapatnam, *Mar. Fish. Infor. Serv., T& ESer,* 2013, 216: 30-32.
5. Yedukondala Rao P., Naga Krishna Veni D.and Rukmini Sirisha I. Trawl net by-catches off Visakhapatnam with special reference to Finfish, *Advances in Applied Science Research*, 2013, 4 (5): 363-371.
6. Central Marine Fisheries Research Institute, *Annual Report*, 2013-14.
7. Marine Products Export Development Authority, "*Statistics of marine products exports*", 2013-14.
8. Sudharani P., Studies on Juvenile and Adult Shrimps of Four Penaeid Species From Gosthani Estuary and Visakhapatnam Harbour: Andhra Pradesh, India., *Ph.D. Thesis*, 2013.
9. FAO *Statistical database*, 2009.
10. Dineshbabu A.P., Radhakrishnan E.V., Sujitha Thomas, Maheswarudu G., Manojkumar P.P., Shoba Joe Kizhakudan, Lskshmi Pillai S., Rekhadevi Chakraborty, Josileen Jose, Sarada P.T., Paramita Banerjee Sawant, Philipose K.K., Deshmukh V.D., Jayasankar J., Subhadeep Ghosh, Mohamed Koya, Purushottama G.B. and Gyanarajan Dash, An appraisal of trawl fisheries of India with special reference on the changing trends in by-catch utilization, *J. Mar. Biol. Ass. India*, 2013, 55 (2): 69-78.
11. Lakshmi Pillai S., Shoba Joe Kizhakudan , Radhakrishnan E.V.Tthirumilu ANDP, Crustacean By-catch from Trawl Fishery along North Tamil Nadu Coast, *Indian J. Fish.*, 2014, 61 (2): 7-13.
12. Gibinkumar T.R., Sabu S., Pravin P.and Boopendranath M.R., By-catch Characterization of Shrimp Trawl Landings off Southwest Coast of India, *Fishery Technology*, 2012, 49 : 132 – 140.
13. George M.J., Suseelan C. and Balan K., By-catch of shrimp fisheries in India, *Mar. Fish. Inf. Serv. Tech. Extn. Ser.*, 1981, 28: 3-13.
14. Sukumaran, K.K., Telang, K.Y. and Thippeswamy. O, Trawl fishery of South Kanara with special reference to prawns and by-catches, *Mar. Fish. Inf. Serv. Tech. Ext. Ser.,* 1982, 44: 8-14.
15. Menon, N.G., Impact of bottom trawling on exploited resources., In *Marine Biodiversity*, *Conservation and Management* (eds. Menon, N.G. and Pillai, C.S.S.), Central Marine Fisheries Research Institute, Cochin, 1996, 97-102.
16. Kurup, B.M., Premlal, P., Thomas, J.V. and Vijay Anand, Bottom trawl discards along Kerala coast: A case study, *J. Mar. Biol. Assoc. India*, 2003, 45 (1): 99-107.
17. Kurup B.M., Premlal, P., Thomas, J.V. and Vijay Anand, Status of epifaunal component in the bottom trawl discards along Kerala Coast (South India), *Fish. Technol*., 2004, 41(2): 101-108.
18. Biju Kumar A and Deepthi G.R., Trawling and bycatch; Implications on marine ecosystem, *Curr. Sci*., 2006, 90 (7): 922-931.
19. Zacharia, P.U., Krishna Kumar P.K., Ravindran, Durgekar N., Anoop, A. Krishnan A.and Muthiah C., Assessment of by-catch and discards associated with bottom trawling along Karnataka coast, India, In *Sustain Fish* (eds.Kurup B.M. and Ravindran K.), Cochin University of Science and Technology, Cochin. School of Industrial Fisheries, Cochin University, Kerala, 2006, 434-445.

20. Biju Kumar A and Deepthi G.R., Mean trophic index of fish fauna associated with trawl bycatch of Kerala, south west coast of India, *J. Mar. Biol. Biol. Ass. India*, 2009, 51 (2): 145-157.
21. Gordon A., By-catch from Indian trawlers, in *Bay of Bengal program BOBP/WP /68*, 1991, 29p.
22. Pillai, N. S., Bycatch reduction devices in shrimp trawling, *Fishing Chimes*, 1998, 18(7): 45-47.
23. FAOSTAT, Food and Agriculture Organization of the United Nations, Rome, Italy, *FAO statistical databases, fisheries data*, 2001, Available from interrehttp://www.fao.org.
24. Ghaly A.E., Ramakrishnan V.V., Brooks M.S., Budge S.M. and Dave D., Fish Processing Wastes as a Potential Source of Proteins, Amino Acids and Oils: A Critical Review, *J. Microb. Technol*., 2013, 5(4): 107-129.
25. Sachindra N.M. and Bhaskara N., In vitro antioxidant activity of liquor from fermented shrimp biowaste, *Bioresource Technology*, 2008, 99: 9013-9016.
26. Sathiadhas R.and Aswathy N., Techno-Economic Analysis of Production and Marketing of Marine By-Products in India, *Journal of the Indian Fisheries Association*, 2004, 31:155-165.
27. Ramyadevi D., Subathira A. and Saravanan S., Potential Recovery of Protein from Shrimp Waste in Aqueous two Phase System, *Research Journal of Chemical Sciences,* 2012, 2(7): 47-52.
28. Ravichandran, S., Rameshkumar G.and A. Rosario Prince A., Biochemical composition of shell and flesh of the Indian white shrimp, *Penaeus indicus*, *American-Eurasian J. Agric. & Environ. Sci.,* 2009, 4: 191-194.
29. Rupsankar Chakrabarti, Carotenoprotein from tropical brown shrimp waste by enzymatic process, *Food Biotechnology,* 2002, 16(1): 81-90.
30. Sindhu S. and Sherief P.M., Extraction, Characterization, Antioxidant and Anti-Inflammatory Properties of Carotenoids from the Shell Waste of Arabian Red Shrimp, *Aristeus alcocki*, Ramadan (1938), *The Open Conference Proceedings Journal,* 2011, 2: 95-103.

*****